MCHEDLOV-PETROSYAN, O. P.

PA 25/49T9

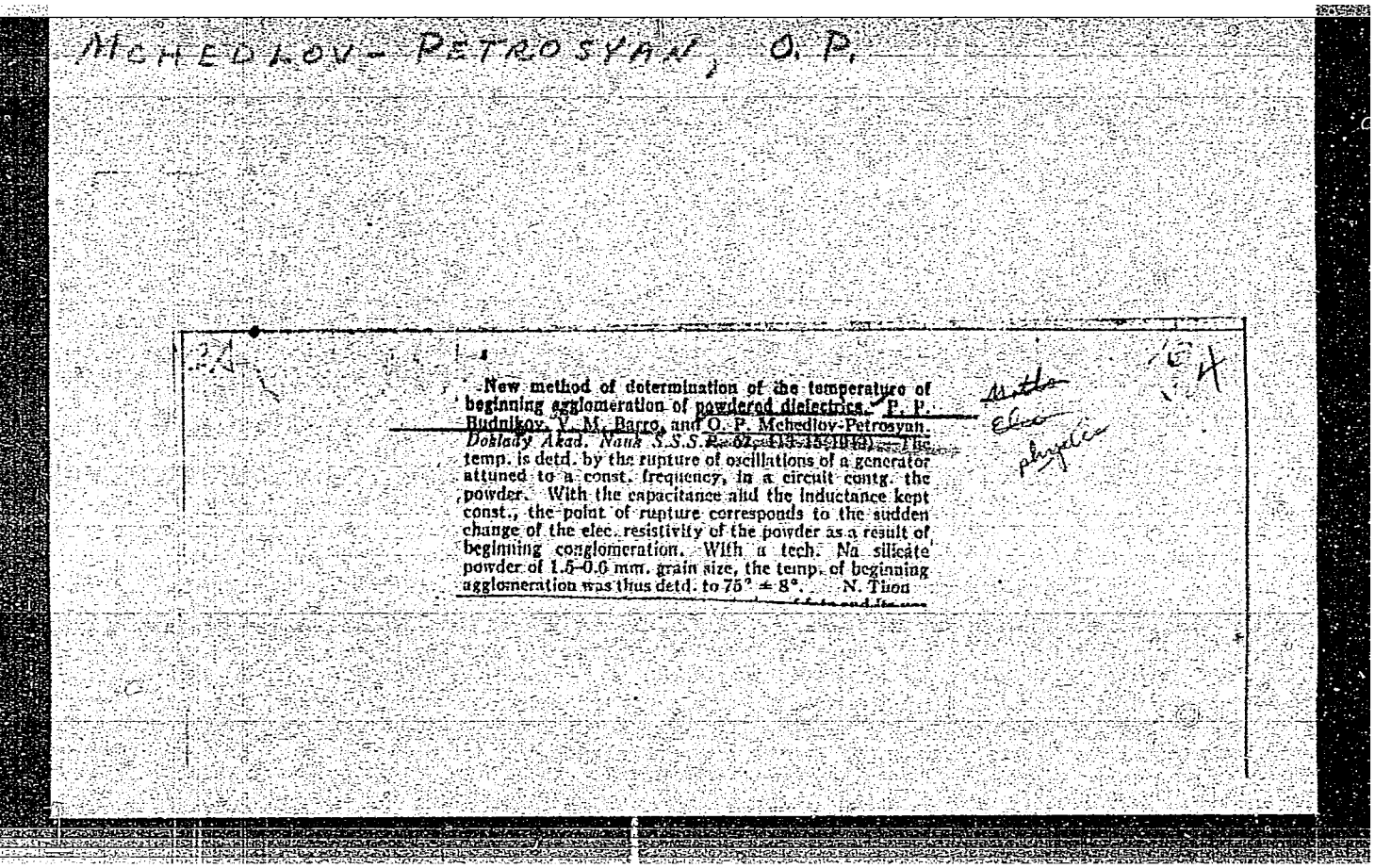
USSR/Chemistry -- Barium Sulfate Jan 49
Chemistry -- Aluminum Oxide

"Products of the Interaction of Barium Sulfate With Aluminum Oxide in the Temperature Range 1,200-1,400° C," G. M. Smirnov, O. P. Mchedlov-Petrosyan, 2 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 2

Experiments with various mixtures of barium sulfate and aluminum oxide confirm that stable intermediate products, aluminates, do form in the temperature interval 1,200-1,400° C. Submitted 7 Sep 48.

25/49T9



MCHEDLOV-PETROSYAN, O. P.

New method of determination of the temperature of beginning agglomeration of powdered dielectrics. P. P. Budnikov, V. M. Barro, and O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.S.R.* 67, 113-15(1949).—The temp. is detd. by the rupture of oscillations of a generator attuned to a const. frequency, in a circuit contg. the powder. With the capacitance and the inductance kept const., the point of rupture corresponds to the sudden change of the elec. resistivity of the powder as a result of beginning conglomeration. With a tech. Na silicate powder of 1.5–0.6 mm. grain size, the temp. of beginning agglomeration was thus detd. to 75° ± 8°. N. Thon

Metallurgy
Elec
physics

CA

19

Changes in serpentine during heating. U. P. Mchedlov-Petrosyan (Inst. Metals & Mining, Acad. Sci. Georgian SSR, Tbilisi). *Ogneupory* 15, 408–11(1950).—Work included x-ray and thermographic studies and detns. of sp. gr., ignition loss during firing, leaching out of MgO with HCl-satd. water, elec. cond. of aq. solns., and free CaO and MgO. Two varieties of serpentine were used. The av. sample analyzed SiO_2 33.60, Al_2O_3 2.05, Fe_2O_3 6.12, FeO 2.21, CaO 2.62, MgO 35.76, SO_3 0.34, K_2O 0.10, and ignition loss 14.73%. Results indicate the presence of active intermediate phases at 500–660°. The nature of the new formations was not definitely established; most characteristic lines of the new formations were close to the lines of anthophyllite.

B. Z. K.

CA

2

Thermodynamic computations for solid-gaseo reactions in systems containing magnesia and silica. O. P. Mchedlov-Petrosyan (Silicate Lab., Tiflis, Georgian S.S.R.). *Zhur. Fiz. Khim.* 24, 1299-1301(1950).—Differences in free energy ΔF between 300° and 1700°K. are calcd. for the reactions (1) $MgO + SiO_2 \rightarrow MgSiO_3$; (2) $2MgO + SiO_2 \rightarrow Mg_2SiO_4$; (3) $MgSiO_3 + MgO \rightarrow Mg_2SiO_4$; (4) $Mg_2SiO_4 + SiO_2 \rightarrow 2MgSiO_3$. Values of $-\Delta F$ at 300 and 1700°K., resp., are (kcal./mole): (1) 8.7 and 7.6; (2) 15.1 and 10.1; (3) 6.4 and 2.4; (4) 2.8 and 5.2. A large ΔF for (2) explains why orthosilicate is formed primarily in all mixts. of MgO and SiO_2. On a plot (ΔF, T), the curves for (3) and (4) intersect at 1160°. Thus metasilicate is not formed below 1160° in a mixt. contg. magnesia, silica, and orthosilicate but may be formed above 1160° by reaction (4) even in the presence of magnesia. This was observed by Avgustinik (*C.A.* 45, 980c). The above data may also be related with the fact (Berezhnoi, *C.A.* 35, 2290°) that the rates of (2) and (3) are the same above 1170°. Serpentine ought to decomp. into $4H_2O + 2MgSiO_3 + 2Mg_2SiO_4$ and not into $4H_2O + SiO_2 + 2MgSiO_3$ as observed. Small quantities of brucite and magnesite in serpentine favor, however, the 2nd scheme, and metasilicate is observed only when serpentine decomp. above 900°.

Michel Boudart

1951

CA

2

Effect of magnetic field on the solid-phase reaction in the system lime-silica. P. P. Budnikov, O. P. Mchedlov-Petrosyan, and S. E. Shou-Shakhbudagyan. *Doklady Akad. Nauk S.S.S.R.* 70, 235-6(1950).—One-g. samples of 1:1 stoichiometric mixts. of CaO and quartz were heated, without and in a field of 10,000 gausses, to temps. ranging from 300 to 1000° in 15 min., held at this desired temp. for 2 hrs., cooled rapidly in a desiccator, and free CaO was detd. by the ethylene glycol method. With rising temp., the effect of the magnetic field on the solid-phase reaction increases. The change in the curve of reacted CaO *vs.* temp. was sharper with than without the magnetic field. At temps. above 800°, the effect of the field increases. At high temps. it may have an orienting effect and may facilitate the formation of crystn. centers of the new phase.
B. Z. Kamich

CA

20

Hydraulic binding properties of dehydrated serpentinite. P. P. Budnikov and O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.R.* 73, 539–40(1950).—Serpentinite analyzing SiO_2 35.00, Al_2O_3 2.05, Fe_2O_3 6.12, FeO 2.21, CaO 2.62, MgO 35.79, SO_3 0.34, alkali 0.10, and ignition loss 14.73%, after being fired at temp. of max. endothermal effect, had the following crushing strength: 25.0 and 45.0 kg./sq.cm. after water storage for 7 and 28 days, resp., and 15.0 and 25.0 kg./sq.cm., resp., after same air storage. With serpentinite of different compns. (not given), strength, after water storage for 28 days, was 116 kg./sq.cm. and with the use of admixts. (not identified) it was raised to 180 kg./sq.cm. Hardening can be explained by (1) formation of $Mg(OH)_2$ which reacts with active SiO_2 to form Mg hydrosilicate, (2) formation of colloidal $Mg(OH)_2$ and subsequent crystn., (3) crystn. of the gel of the hydrated products of firing, with the formation of interlocking dimetric structures. B. Z. Kanich

MCHEDLOV-PETROSYAN, O. P.

2501. Thermal properties of serpentine and kaolin.—O. P. MCHEDLOV-PETROSYAN (*Dok. Akad. Nauk, U.S.S.R.*, 74, 799, 1950). According to the newest data, kaolin $Al_2(OH)_4Si_2O_5$ and serpentine (antigorite) $Mg_3(OH)_4Si_2O_5$ are included in one sub-group of the dimetasilicates with a sheet structure. The purpose of this work is to draw a parallel between the changes taking place in both minerals during heating and to try and draw some conclusions on their thermal properties. Since the components of serpentine (MgO and SiO_2) are more dissimilar in their properties than those of kaolin, a chem. study of the products of serpentine when fired should give more definite data than such a study of kaolin. The results of such a study could perhaps be applied, not without some foundation, to the properties of kaolin. Thermal properties of serpentine, olivine, crysolite, forsterite, metakaolin, etc., are further considered. It is assumed that the mullitization of kaolin passes through an intermediate stage of the formation of a cpd. resembling sillimanite (similar thermodynamically to olivine); this cpd. later transforms into mullite. The intermediate cpd. is conceived as a preliminary stage of mullite formation in the same way as the "formation" of metakaolin is the preliminary stage for the formation of this cpd. After the removal of water, while the plates remain hexagonal, there are certain stresses in the lattice and the first stage of their release is the formation of the intermediate cpd. with a separation of SiO_2 tetrahedra and emission of heat, which might be called "relaxation" heat after a strain caused by dehydration. Al_2O_3 octahedra convert directly from the stage of an amorphous oxide mixture of "metakaolin" into the stage of the sillimanite-like intermediate cpd. and then into mullite. This transformation is gradual, perhaps it is somewhat accelerated during the second exothermic effect (the stage of accelerated mullite formation) on account of the completion of the formation of the intermediate cpd., its concentration and transformation into mullite (a second "relaxation," as it were). (2 figs.)

Mchedlov-Petrosyan, O.P.

Bonding characteristics of magnesium silicates. O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.S.R.* 76, 867–9 (1951).—During removal of water from serpentine, there is a temporary decrease in the coördination no. of Mg. At 660–720°, there is a drop in sp. gr., in n_D, and in crushing strength. Redistributed cations create voids into which the OH^- ions of the water medium penetrate, thus exhibiting bonding characteristics. B. Z. Kamich

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AVGUSTINIK, A. I., MCHEDLOV-PETROSYAN, O. P.

Thermodynamics

Thermodynamics investigation of the systems cadmium-zinc, cadmium-lead, cadmium-tin, bismuth-cadmium, tin-zinc, and lead-tin. IZV. AN SSSR Otd.khim.nauk. No. 2, 1952.

9. Monthly List of Russian Accessions, Library of Congress, August 1952 ~~1953~~, Uncl.

MCHEDLISHVILI-PETROSYAN, O. P.

Journal of the American
Ceramic Society
July 1954
Chemistry and Physics

(2)

General theory of activity of clay minerals. O. P. MCHEDLISHVILI-PETROSYAN. *Soobshcheniya Akad. Nauk Gruzinskoi S.S.R.*, 13 [6] 35–37 (1952).—With a small number of examples, the natural activity of clays of the montmorillonite group is compared with the acquired activity of kaolinite clays calcined at 500° to 800°C. B.Z.K.

MCHEDLOV-PETROSYAN, O. P.

Chemical Abstracts
Vol. 48 No. 5
Mar. 10, 1954
General and Physical Chemistry

3 Chem (2)

Thermodynamics of mullite formation. A. I. Avgustinik and O. P. Mchedlov-Petrosyan. *Zhur. Priklad. Khim.* 25, No. 2, 216–18(1952). — Data are given on ΔH_{298} and ΔF_{298} as a function of temp. in the formation of mullite by use of the reactions (*a*) $Al_2O_3 + SiO_2 \rightarrow Al_2O_3.SiO_2$, (*b*) $3Al_2O_3 + 2SiO_2 \rightarrow 3Al_2O_3.2SiO_2$, (*c*) $3(Al_2O_3.2SiO_2) \rightarrow 3Al_2O_3.2SiO_2 + 4SiO_2$, (*d*) $Al_2O_3.2SiO_2 \rightarrow Al_2O_3.SiO_2 + SiO_2$, and (*e*) $3(Al_2O_3.SiO_2) \rightarrow 3Al_2O_3.2SiO_2 + SiO_2$. Comparison of (*a*) and (*b*) indicates that the formation of sillimanite, in comparison with mullite, is less probable. Judging from the shape of the *F*-temp. curve, the formation of sillimanite up to about 1200°K. is highly possible. Comparison of (*c*) and (*d*) indicates that above 1100°K. metakaolin should form mullite and not sillimanite, since variation in ΔF occurs most intensively for reaction (*c*). Mullite is formed in kaolin-bearing materials regardless of formation of metakaolin or decompn. of kaolin into oxides. Intermediate non-stoichiometric formations are not accounted for.

B. Z. Kamich

MCHEDLISHVILI-PETROSVAN, O.P.

Chemical Abstracts
May 25, 1954
Glass, Clay Products

(2)

General theory of activity of clay minerals. O. P. Mchedlishvili-Petrosvan (Inst. Metals & Mining, Acad. Sci. Georgian S.S.R., Tiflis). *Soobshcheniya Akad. Nauk Gruzin. S.S.R.* 13, 355–7(1952).—Examples are given to compare the natural activity of clays of the montmorillonite group with the acquired activity of kaolinite clays after calcination at 500–800°.
B. Z. Kamich

MCHEDLOV-PETROSYAN, O.P.

PA 234T47

USSR/Engineering - Construction, Materials   Oct 52

"Alunite Cement," K. S. Kutateladze, O. P. Mchedlov-Petrosyan, Kh. I. Gogicheva, Inst of Metals and Mining, Acad Sci Georgian SSR

"Dok Ak Nauk SSSR" Vol 86, No 6 pp 1179-1182

Describes expts for obtaining alumina-type cement from a mixt of alunite and limestone. Presents results of X-ray and microscopic examn of alunite and final product. Suggests addn of 0.25% soln of

234T47

spruce tanning extract as measure against quick setting of cement. Submitted by Acad D. S. Belyankin 9 Aug 52.

234T47

LANDIYA, N.A.; MCHEDLOV-PETROSYAN, O.P.

Thermodynamics of the solid-phase reactions in the system calcium oxide-silica. Zhur. Fiz. Khim. 26, 1785-90 '52. (MLRA 6:2)
(CA 47 no.13:6231 '53)

1. Politekhnicheskiy institut imeni S.M. Kirova, Tiflis.

MCHEDLOV-PETROSYAN, O.P.

The solubility of serpentinite after heating. O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.S.R.* 87, 449–51 (1952); cf. *C.A.* 49, 100a.—Georgian serpentinite (62) (H_2O 14.85, SiO_2 35.69, MgO 36.35, Al_2O_3 1.95, Fe_2O_3 6.66, Cr_2O_3 0.38, FeO 1.70, CaO 1.72, MnO 0.07, and K_2O + Na_2O 0.06%) and true serpentine (H_2O 12.12, SiO_2 44.09, MgO 42.53, Al_2O_3 0.40, and Fe_2O_3 0.50%), powd. and pressed into tablets, were heated in a magnetic field (800 gausses, poles 16 mm. apart). The time of heating from room temp. to the desired temp. was 15 min. The soly. of SiO_2 (in 15% soln. Na_2CO_3) and MgO (in 10% soln. NH_4Cl) were measured after the samples were heated up to 2 hrs. The highest soly. was obtained after 30 min. at 700° for SiO_2 and 600° for MgO with the Georgian serpentinite, and 850 and 700°, resp., with the true serpentine. Heating longer than 30 min. and temp. higher than the optimum reduced the soly. sharply. The effect of the magnetic field was substantial only with the Georgian serpentinite. In both, however, the application of a magnetic field increased the soly. of SiO_2 and decreased that of MgO.

R. S. Lubomirski

MCHEDLOV-PETROSYAN, O.P.

(Otar Petrovich)

"Physicochemical Properties of Serpentinite, and Obtaining Cements and Refractories Based on it." (Dissertation), Academic degree of Doctor in Chemical Sciences, based on his defense, 15 October 1953, in the Council of the Inst of Physical Chemistry, Acad Sci USSR, and Academic title of Professor; Chair: Construction materials, work and buildings,

Khar'kov Inst of Railroad Transport Engineers im. Kirov.

-M- 3,054,778, 2 Oct 57.

BUDNIKOV, P.P., chlen-korrespondent; BARRO, V.M.; MCHEDLISHVILI-PETROSYAN, O.P.; TVALCHRELIDZE, A.A., deystvitel'nyy chlen.

Use of dielectrical analysis for investigation of changes of minerals during heating. Soob.AN Gruz.SSR 14 no.1:27-31 '53. (MLRA 6:9)

1. Akademiya nauk Gruzinskoy SSR (for Tvalchrelidze). 2. Ordena Lenina Moskovskiy khimiko-tekhnologicheskiy institut im. D.I.Mendeleyeva (for Budnikov, Barro and Mchedlishvili-Petrosyan). 3. Akademiya nauk SSSR (for Budnikov).
(Dielectrics) (Mineralogy)

LANDIYA, N.A.; MCHEDLOV-PETROSYAN, O.P.

Concerning V.I.Lebedev's article "Some examples of energy analysis of processes in the formation of silicates according to Professor S.A.Shchukarev's method." Zap.Vses.min.ob-va 82 no.3:228-229 '53. (MLRA 6:11)
(Silicates)

Nature of bonding properties. O. P. Mchedlov-Petrosyan. *Doklady Akad. Nauk S.S.S.R.*, 80 [illegible]. The nature of bonding properties is explained on the basis of pH study and electron microscope observation of hydrating serpentine cement. In mixing the bonding substance with water, increased pH values are required. The presence of excess OH^- creates conditions for its attraction to active locations with decreased coordination of cations. The entry of OH^- causes decomposition of the lattice into individual complexes of a magnitude of 10^{-3} cm. These complexes form aggregates and, during subsequent crystallization, form the cement stone. B.Z.K.

MCHEDLOV-PETROSYAN, O.P.

Change in optical properties of serpentine during firing. O. P. Mchedlov-Petrosyan, L. I. Karyakin, and G. M. Shirnov. Doklady Akad. Nauk S.S.S.R., 95 [3] 617-20 (1954).—Experiments were conducted with serpentinite consisting of a mixture of chrysotile and antigorite and precious serpentine consisting mostly of antigorite. Up to 500°C. there was no noticeable change in the materials. Loss of 2% water by serpentinite and 1% by serpentine caused no fundamental changes in the mineral base. There was a slight increase in index of refraction. From 500° to 600°, the serpentinite lost most of its water and the indices of refraction decreased. Starting at 600°, with the loss of the residual water, there was an increase of n_γ and n_α. In the case of serpentine, there was small variation of the indices of refraction with the loss of most of the water. Further insignificant loss of water at 700° to 900° was accompanied by a sharp drop in the indices, and after complete loss of water, there was a rise in n_γ and n_α. B.Z.K.

MCHEDLOV-PETROSYAN, O. P.

Desulphurizing Cupola Cast Iron with Serpentine. O. P. Mchedlov-Petrosyan and E. P. Petrosyan. (*Liteinoe* [illegible] [illegible]). [In Russian]. Results of tests lasting 2 min. using raw or calcined serpentine for desulphurizing cast iron are presented. For some tests the finely powdered mineral was added directly to the metal in the ladle. With raw serpentine and an iron containing 0·143% S a maximum desulphurization of 35·5% was obtained, the corresponding figures for calcined serpentine being 0·104 and 61·1%. In another test the mineral was used to coat the ladle-lining and here an iron with 0·117% S was desulphurized by 47·0%. The advantages of the serpentine over the soda-ash process are briefly mentioned.—S. K.

MCHEDLOV-PETROSYAN, O. P.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
General and Physical Chemistry

Chem.

Dmitrii Stepanovich Belyankin, P. P. Budnikov, A. S. Berezhnoi, O. K. Botvinkin, S. S. Davydov, Kh. O. Gevorkyan, K. B. Goryainov, V. P. Kupriyanov, I. P. Kitaigorodskii, V. G. Kukolev, V. V. Lapin, A. A. Litvakovskii, V. M. Moskvin, S. A. Mitkinov, O. P. Mchedlov-Petrosyan, R. L. Peyzner, B. G. Skramtaev, V. N. Yung, and M. V. Yushkevich. *Zhur. Prikład. Khim.* 27, 3–4(1954).—Obituary with portrait and summary of scientific work in phys. chemistry and the silicates. G. M. Kosolapoff

9-2-54 GMK

MCHEDLOV-PETROSYAN, O.P.

Erroneous interpretation of the differential thermal curves of kyanite and andalusite. O. P. Mchedlov-Petrosyan. *Zapiski Vsesoyuz. Mineralog. Obshchestva* (Mem. soc. russe minéral.) 83, 159 (1954).—The conclusions of several Russian authors (Sobolev, Lebedev) that the effects of kyanite and andalusite in their modification changes to mullite (Greig, *C.A.* 20, 650) would be exothermic are erroneous. The original data of G. show in the ordinate of the graphs the difference of temps. indicated by a Le Chatelier-Saladen differential galvanometer, with corundum as the inert body, vs. the samples. The peaks on the $\Delta T/T$ curves are, therefore, typical endothermic effects.

MCHEDLOV, O.P

USSR

Changes in the optical properties of serpentine by heating. O. P. Mchedlov-Petrosyan, L. T. Karyakin, and G. M. Smirnov (S. M. Kirov Inst. Engineers of Railroad Transport, Kharkov). *Doklady Akad. Nauk S.S.S.R.* 96, 817-20 (1954).—The structural analogy between antigorite and kaolinite (on its dehydration (Belyankin and Feodat'ev, *C.A.* 45, 7477*f*)) makes the optical investigation of the dehydration products of serpentine highly suggestive. The serpentinite from Tanelisskii (Georgian S.S.R.) is a mixt. of chrysotile and antigorite. This and a gem serpentine (chiefly antigorite) were taken as starting materials. While kaolinite entirely loses its birefringence in the meta-phase, the birefringence of fired serpentines is always marked. In the temp. range of rapid dehydration (500° to 600° for the common serpentine, 550° to 700° for the gem material) the *ns* decrease, with a min. at 600° for the common serpentine, but rapidly increased beyond 600° in both minerals. Intermediate phases (if they exist) must be ephemeral. Apparently, the antigorite tables in the gem serpentine are changed to a fibrous product of chrysotile-like aspect. The authors conclude that the first, intermediate phase with decreased *ns* is a Mg silicate with some OH groups still preserved in the structure. The x-ray powder diagrams given for the gem serpentine, heated to 500° (for 2 and 5 hrs.), 670° (for 2 and 5 hrs.), and 760° (for 5 hrs.) show even at the highest temps. not one strong line indicative for olivine. The intermediate phase is, therefore, a different silicate, at least stable in the interval between 600° and 800°. Only after the complete dehydration (above 800°) do the *ns* distinctly increase. W. Ritel

MCHEDLOV-PETROSYAN, O.A., doktor tekhnicheskikh nauk; BUNAKOV, A., inzhener; VOROMTSOV, Ye., inzhener.

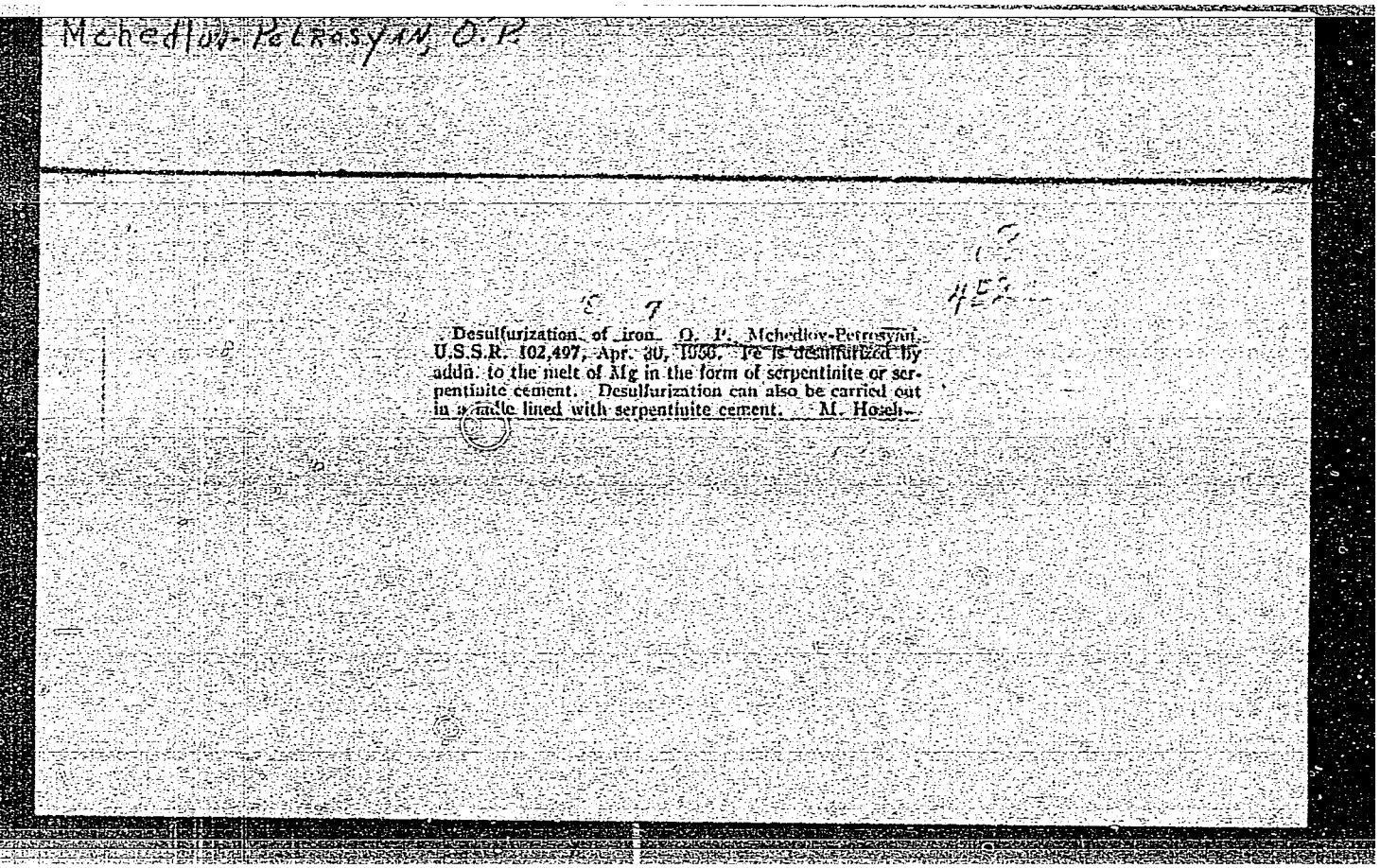
Effect of early loading on the strength of cement mortars. Stroi.mat., izdel.i konstr. 1 no.6:28-29 Je '55. (MLRA 9:1)
(Mortar)

KUTATELADZE, K.S.; MCHEDLISHVILI-PETROSYAN, O.P.; GOGICHEVA, Kh.I.

Using gaize in making slag cement. Soob.AN Gruz.SSR 16 no.2:125-131 '55. (MLRA 9:2)

1.Akademiya nauk Gruzinskoy SSR, Institut metalla i gornogo dela, Tbilisi.Predstavleno chlenom-korrespondentom Akademii G.K.Gedevanishvili.

(Slag cement) (Gypsum)



Mchedlov-Petrosyan, O. P.

C 7

Desulfurization of iron. O. P. Mchedlov-Petrosyan. U.S.S.R. 102,497, Apr. 30, 1956. Fe is desulfurized by addn. to the melt of Mg in the form of serpentinite or serpentinite cement. Desulfurization can also be carried out in a ladle lined with serpentinite cement. M. Hosch

Mchedlov - Petrosyan, O. P.

USSR/Chemical Technology - Chemical Products and Their Application. Ceramics. Glass. Binders. Concrete. H-7

Abs Jour : Referat Zhur - Khimiya, No 1, 1958, 1970

Author : Mchedlov-Petrocyan O.P.
Inst :
Title : Alteration of Clays on Heating

Orig Pub : Sb.: Fiz.-khim. osnovy keramiki. M., Promstroyizdat, 1956, 95-113

Abstract : During the heating of clays 4 periods occur: low-temperature dehydration, high-temperature dehydration, lattice rearrangement and high-temperature alterations. On removal of most of the water from the twolayer minerals of the kaolin group there takes place the formation of an active, unstable, intermediate state with some orderliness of structure. The small amount of structural hydroxides in montmorillonites is the cause of lesser amorphization (than in the case of kaolinite) on removal of water from them.

Card 1/2

15-57-5-6564

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 5, p 123 (USSR)

AUTHOR: Mchedlov-Petrosyan, O. P.

TITLE: Serpentinite Cement (Serpentinitovyy tsement)

PERIODICAL: Sb. nauch. rabot po khimii i tekhnol. silikatov. Moscow, Promstroyizdat, 1956, pp 153-166.

ABSTRACT: During roasting of serpentinite at a temperature of about 670°, a magnesian silicate bonding material was produced. It represents the simplest type of hydraulic cement produced by simple dehydration. The serpentinite bonding material has a lower roasting temperature than hydraulic cement. It may be considered transitional between portland cement (typically represented by a bonding in which the oxide components are chemically united) and calcareous cement with hydraulic additions (in which the primary oxide components are represented by mechanical mixtures). The presence of combinations with bonding properties in the system $MgO-SiO_2$ (almost anhydrous serpentine) disproves the

Card 1/2

Serpentinite Cement (Cont.)

view that magnesian silicate combinations have no bonding properties. Serpentinite cement may be used for fire-resistant concrete and may also be successfully used for earthquake-proof construction.

Card 2/2

V. P. Ye.

15-57-7-9468

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 7, p 107 (USSR)

AUTHOR: Mchedlov-Petrosyan, O. P.

TITLE: Thermodynamics of ~~Solid-State~~ Reactions of Silicate Systems (K termodinamike tverdofazovykh reaktsiy v silikatnykh sistemakh)

PERIODICAL: V sb: Fiz.-khim. osnovy keramiki. Moscow, Promstroyizdat, 1956, pp 499-503

ABSTRACT: Bibliographic entry

Card 1/1

LATYSHEV, F., assistent; BUNAKOV, A., assistent; MCHEDLOV-PETROSYAN, O., prof.; DUDNIK, F., nauchnyy sotrudnik; GORDON, S., kand. tekhn. nauk.

Using substandard sand in making concretes. Stroi. mat. 2 no.10: 25-28 O '56. (MIRA 12:3)

1.Yuzhnyy nauchno-issledovatel'skiy institut, Dnepropetrovsk (for Dudnik).

(Sand) (Concrete)

MCHEDLOV-PETROSYAN, O.P.

D.C.Korzhinskii's article "Exaggerated role of solar energy in the energetics of the earth's crust." Reviewed by O.P.Mchedlov-Petrosyan, O.P. Min.sbor. no.10:381-383 '56. (MLRA 9:12)

1. Institut inzhenerov zheleznо-dorozhnogo transporta imeni S.M.Kirova.

(Solar radiation) (Geochemistry)
(Korzhinskii, D.S.)

BUDNIKOV, P.P.; MCHEDLOV-PETROSYAN, O.P.

Conference on the use of vibrational grinding in the building materials industry. Zhur.prikl.khim. 29 no.5:645-650 My '56. (MIRA 9:8)

(Building materials) (Milling machinery)

BURIAKOV, A.G., inzhener; VORONTSOV, Ye.Ye., inzhener; MCHEDLOV-PETROSYAN, O.P., inzhener.

Relations of the optimum loading time of mortars to the hardening period of cement. Stroi.prom. 34 no.2:43 F '56. (MLRA 9:5)
(Concrete)

KROTKOV, N.; MCHEDLOV-PETROSYAN, O., doktor tekhnicheskikh nauk (g.Khar'kov)
VOROB'YEV, Yu., inzhener (g.Khar'kov)

Letters and suggestions. Stroi.mat. 3 no.1:31 Ja '57. (MLRA 10:3)

1. Predsedatel' zavodskogo komiteta zavoda im. Boykova (for Krotkov)
(Serpentinites) (Rewards (Prizes,etc.))

MCHEDLOV-PETROSYAN, O.P.

BUDNIKOV, P.P., akademik; MCHEDLOV-PETROSYAN, O.P.

Theory of the "pyrocatalysis method" of brick firing. Stek.i ker. 14 no.8:11-13 Ag '57. (MIRA 10:10)

1. Akademiya nauk USSR (for Budnikov).
(Brickmaking)

MCHEDLOV-PETROSYAN, O. P.

BUDNIKOV, P.P.; MCHEDLOV-PETROSYAN, O.P.

"The chemistry of cements" by N.A. Toropov. Reviewed by P.P. Budnikov, O.P. Mchedlov-Petrosian. Zhur.prikl.khim. 30 no.4:664 Ap '57. (MLRA 10:7)
(Cement) (Chemistry, Technical) (Toropov, N.A.)

ANDREYEV, Nikolay Vladimirovich, dots., kand. tekhn. nauk,; BERLIN, Vasiliy Ivanovich, dots., kand. tekhn. nauk,; MCHEDLOV-PETROSYAN, Otar Ratrovich, prof., doktor tekhn. nauk,; SHUBNIKOV, Aleksey Kuzmich, prof., doktor tekhn. nauk, red.; PESKOVA, L.N., red.; VERINA, G.P., tekhn. red.

[Textbook on materials for railroad transportation workers] Materialovedenie na zheleznodorozhnom transporte. Pod obshchei red. A.K.Shubnikova. Moskva, Gos. transp. zhel-dor. izd-vo, 1958. 461 p. (MIRA 11:10)

(Railroad engineering)
(Materials)

MCHEDLOV-PETROSYAN, O. P. and K. A. KINKLADZE

"Calorimetric Analysis of Hydrating Processes in Dehydrated Stratified Hydrosilicates" p. 180

~~"Synthesis and Structure of Hydrosilicates containing Simple and Complex Heavy Metal Cations." p. 38~~

Transactions of the Fifth Conference on Experimental and Applied Mineralogy and Petrography, Trudy ... Moscow, Izd-vo AN SSSR, 1958, 516pp.

reprints of reports presented at conf. held in Leningrad, 26-31 Mar 1956. The purpose of the conf. was to exchange information and coordinate the activities in the fields of experimental and applied mineralogy and petrography, and to stress the increasing complexity of practical problems.

BERNSHTEYN, S.; DANILOV, A.; LYSYKH, G.; MCHEDLOV-PETROSYAN, O.(Khar'kov)

Raising the strength of concrete by treating it with hyposulfate.
Stroi. mat. 4 no. 6:33 Je '58. (MIRA 11:7)
(Concrete)

GOGICHEVA, Kh.I.; KUTATELADZE, K.S.; MCHEDLOV-PETROSYAN, O.P.

Physicochemical properties of some dolomites of the Georgian S.S.R.
Soob. AN Gruz. SSR 21 no.1:57-61 Jl '58. (MIRA 11:10)

1. AN GruzSSR, Institut prikladnoy khimii i elektrokhimii, Tbilisi.
Predstavleno akademikom R.I. Agladze.
(Georgia--Dolomite)

MCHEDLOV-PETROSYAN, O.P.; BUNAKOV, A.G.

Crystallochemical nature of temperature effects in mineral binders.
Soob. AN Gruz. SSR 21 no.4:429-432 O '58. (MIRA 12:4)

1. Khar'kovskiy institut inzhenerov zheleznodorozhnogo transporta im. S.M. Kirova. Predstavleno akademikom K.S. Zavriyevym.
(Binding materials)

BUDNIKOV, P.P.; MCHEDLOV-PETROSYAN, O.P.

Conference on the modern methods of analysis of silicates and building materials. Zhur. prikl. khim. 31 no.10:1612-1614 O '58.
(MIRA 12:1)

(Silicates) (Building materials)

MCHEDLOV-PETROSYAN, O. P.; LATYSHEV, F. A.; BUNAKOV, A. G.; LEVCHUK, N. A.

"The Thermodynamic Investigation of Cement Vibro-Activation."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference on General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

SOV/80-59-1-7, 11

AUTHORS: Babushkin, V.I. and Mchedlov-Petrosyan, O.P.

TITLE: Thermodynamical Study of Solid Phase Reactions in the Calcium Oxide - Alumina System (Termodinamicheskoye izucheniye tverdofazovykh reaktsiy v sisteme okis' kal'tsiya - glinozem)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Nr 1, pp 46-50 (USSR)

ABSTRACT: The authors undertook an investigation in order to establish thermodynamical conditions for possible reactions in the system containing calcium oxide and alumina and to study the kinetics of calcium aluminate formation in this system. Thermal capacities for various systems were either taken from the Kelley report [Ref. 19] or computed from entropies [Ref. 20]. On the basis of thermodynamical calculations the authors give the quantitative grounds for the succession of the formation of compounds in solid phase reactions of the calcium part of the $CaO - Al_2O_3$ system, and cite equations for the calculation of free energies in 10 possible reactions for the $CaO - Al_2O_3$ system. In conclusion they propose a scheme of aluminates formation and point out some mistakes in the theory of Portland-cement calcination.

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SOV/[illegible]

Thermodynamical Study of Solid Phase Reactions in the Calcium Oxide - Alumina System

There are 2 tables, 1 graph and 1 references, 11 of which are Soviet, 5 German, 3 American, 1 Japanese and 1 Italian.

SUBMITTED: May 22, 1957

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MCHEDLOV-PETROSYAN, O.P.; LEVCHUK, N.A.; BUNAKOV, A.G.; LATYSHEV, F.A.; STRELKOVA, I.S.

Thermographical investigations of the effect of vibrating on cement mixes. Silikaty no.2:67-69 '59. (MIRA 13:6)
(Cement) (Vibration)

PELIKHOV, G.V., inzh.; VOROB'YEV, Yu.L., inzh.; MCHEDLOV-PETROSYAN, O.P., doktor tekhn.nauk
Improving the quality of clay bricks manufactured by the "Stroikeramika" Plant. Sbor. trud. IUAHNII no.2:84-91 '59. (MIRA 13:9)

1. Khar'kovskiy institut inzhenerov zheleznо-dorozhnogo transporta imeni S.M.Kirova.
(Kharkov-- Brickmaking)

MCHEDLOV-PETROSYAN, O.P., prof., doktor tekhn. nauk

New works on the chemistry and technology of silicates; at the 8th Mendeleev Congress. Stroi. mat. 5 no.5:17-18 My '59. (MIRA 12:8)
(Silicates)

BABUSHKIN, V.I.; MCHEDLOV-PETROSYAN, O.P.

Thermodynamic study of solid phase reactions in the system calcium - alumina. Zhur.prikl.khim. 32 no.1:46-50 Ja '59. (MIRA 12:4)

(Calcium) (Alumina) (Phase rule and equilibrium)

5 (1, 2)

AUTHORS: Mchedlov—Petrosyan, O. P., Babushkin, V. I.

SOV/20-128-2-35/59

TITLE: On the Utilization of Crystallochemical Data for the Thermodynamic Analysis of Processes Involved in the Hydrothermal Synthesis of Calcium Hydrosilicates

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 348-351 (USSR)

ABSTRACT: It is important in the investigation of chemical processes proceeding in the systems $Ca(OH)_2$-SiO_2-H_2O (β-C_2S-H_2O, C_3S-H_2O to take into account, besides other methods, also the thermodynamic probability of the formation of the one or other compound. Direct determination of the heat of formation and other thermal constants is very difficult since the gels produced have a fine-crystalline structure (Refs 1-4). Indirect solution of this problem became possible as soon as N. V. Belov and Kh. S. Mamedov (Ref 5) had determined the structures of several calcium hydrosilicates. Accordingly, the lacking thermodynamic characteristics were determined in the present paper. The calculations were based upon the structural peculiarities and the nature of the interatomic bonds of the

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On the Utilization of Crystallochemical Data for the Thermodynamic Analysis of Processes Involved in the Hydrothermal Synthesis of Calcium Hydrosilicates

SOV/20-128-2-35/59

hydrosilicates. 9 minerals were investigated: hillebrandite, afwillite, foschagite, xonotlite, riversidite, tobermorite, plombierite, gyrolite, and okenite. All are mostly hydrated wollastonites. The unknown heat of formation of these hydrosilicates was calculated from the average bond energies (Ref 6) of Si-O, Ca-O, Ca-O-H, O-H with special regard to the proportion of crystal water for those compounds in which it was undoubtedly present. The authors estimated the average bond energies under consideration of the structure of the minerals mentioned (Ref 5) and on the basis of reliable initial data for β-wollastonite and portlandite (Ref 10). Table 1 gives the data for the calculation of the standard entropies of the hydrosilicates. The values of free energy were calculated according to the formula $\Delta Z = \Delta H - T\Delta S$. Many necessary data were taken from publications (Refs 9-11). The results are given in table 2. The formation reactions (totally 81 reactions) of the hydrosilicates given in table 2 within the temperature range 25-100° were also investigated on this basis. The equations $\Delta Z = f(T)$ were derived for all reactions

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On the Utilization of Crystallochemical Data for the Thermodynamic Analysis of Processes Involved in the Hydrothermal Synthesis of Calcium Hydrosilicates

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investigated on the strength of the utilized data. Furthermore, a thermodynamic analysis was made concerning the probability of their occurrence under standard and hydrothermal conditions. All reactions investigated in the system $Ca(OH)_2$-SiO_2-H_2O appeared thermodynamically possible, and the products formed in the temperature range investigated were stable. Individual minerals are enumerated which are most probable for various temperature ranges. In the system C_3S-H_2O all reactions investigated are also possible within the entire temperature range (Fig 2 A). In the system β-C_2S-H_2O (Fig 2 B) the reactions Nr 1-4, 6-8 are possible in principle at normal temperature (25°), whereas Nrs 5 and 9 are impossible. Definite conclusions from the results obtained may be only drawn if the basic properties of individual calcium hydrosilicates (water resistence, shrinking capacity, strength characteristics, etc) are known. There are 2 figures, 2 tables, and 23 references, 12 of which are Soviet.

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MCHEDLOV-PETROSYAN, O.P.

PHASE I BOOK EXPLOITATION SOV/5277

Akademiya nauk Gruzinskoy SSR. Institut prikladnoy khimii i elektrotekhniki.

Trudy, t. 1 (Academy of Sciences of the Georgian SSR. Institute of Applied Chemistry and Electrochemistry. Transactions) v. 1. Tiflis, 1960. 186 p. Errata slip inserted.

Personalities cannot be established in Georgian writing.

PURPOSE: This collection of articles is intended for mineralogists, metallurgists, and mining specialists.

COVERAGE: The collection contains articles concerning recent research on methods for treating antimony- and arsenic-bearing ores and carbonate ores of manganese. Research on the electrochemical properties of certain ores and their electrodeposition is also discussed. The collection includes

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Institute of Applied Chemistry (Cont.) SOV/5277

studies on the corrosion and electrical properties of certain alloys, studies of the properties of certain cements and cement components, and studies of certain phases of the cement production process. The following personalities are mentioned: Professor N. A. Figurovskiy and his scientific assistant T. B. Gavrilova (p. 118, bottom); R. I. Agladze, Academician, AN GSSR (AS Georgian SSR) (p. 150); S. D. Dzhaparidze and N. I. Lagidze (p. 171). The articles which are written in Georgian are followed by a resumé in Russian. References accompany each article.

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BUDNIKOV, Petr Petrovich, akademik, zasluzhennyy deyatel' nauki i tekhniki, trizhdy laureat Stalinskoy premii; KUKOLEV, G.V., prof., doktor tekhn.nauk, otv.red.; BEREZHNOY, A.S., red.; AVGUSTINIK, A.I., prof., red.; BUTT, Yu.M., prof., red.; MCHEDLOV-PETROSYAN, O.P., prof., red.; GINSTLING, A.M., prof., red.; SMELYANSKIY, I.S., prof., red.; ZNACHKO-YAVORSKIY, I.L., kand.tekhn.nauk, red.; ZHIKHAREVICH, S.A., kand.tekhn.nauk, red.; KRECH, E.I., kand.tekhn.nauk, red.; MATVEYEV, M.A., kand.tekhn.nauk, red.; ROYAK, S.M., kand. tekhn.nauk, red.; NEMCHENKO, Ye.M., red.izd-va; MARCHUK, G.T., red.izd-va; KADASHEVICH, O.A., tekhn.red.

[Selected works] Izbrannye trudy. Kiev, Izd-vo Akad.nauk USSR, 1960. 571 p. (MIRA 13:7)

1. AN USSR; chlen-korrespondent AN SSSR (for Budnikov). 2. Chlen-korrespondent AN USSR (for Berezhnoy).
(Silicates) (Ceramic materials) (Refractory materials)
(Binding materials)

S/063/60/005/002/008/008/XX
A051/A029

AUTHORS: Mchedlov-Petrosyan, O. P., Corresponding Member of the UkrSSR, Academy of Construction and Architecture, Babushkin, V. I.

TITLE: Chemical Thermodynamics in Solving Technological Problems of Building Materials

PERIODICAL: Zhurnal vsesoyuznogo Khimicheskogo Obshchestva im. D. I. Mendeleyeva, 1960, Vol. 5, No. 2, pp. 126-133

TEXT: A thermodynamic study of chemical processes on comparatively few parameters shows the possibility of the processes and their direction (Ref. 1-4). The further development of silicate thermodynamics needs: a) calorimetric methods for determining thermal constants (Ref. 5-7), b) the work on quantitative thermography (Ref. 8,9), c) computing methods of entropy and thermal capacity of crystal compounds (Ref. 1-3, 11), d) work on the thermodynamics of slag and glass (Ref. 11-13). According to the theory of chemical equilibrium, any spontaneous isothermal process follows the direction of the decrease in free energy, i. e., the isobar-isothermal potential (ΔZ). Based on the value of $\Delta Z = f(T)$, it can be ascertained: whether the supposed interaction takes place between

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Chemical Thermodynamics in Solving Technological Problems of Building Materials

reacting substances; which of the several probable reactions is most likely to take place; to what extent can the reaction take place, depending on the energy conditions. The chemical reactions of silicate technology are divided into two large groups: 1) pyrosilicate reactions, to which all reactions in the solid phase, also in silicate melts and slag belong and 2) the reactions of solidification of mineral binding materials (the processes of dilution, chemical reaction, crystallization from aqueous solutions of silicates, etc.) The principle described by G. Tammann (Ref. 19) is used as the basis for the thermodynamic approach to the study of the solid-phase reactions. The authors point out that the systematic application of the thermodynamic principles was suggested by them previously for studying reactions in the solid phase (Ref. 4, 20-25). In silicate technology the following reactions are included amongst the solid-phase type: 1) reactions between solid oxides SiO_2, CaO, Al_2O_3, MgO, BaO, etc., 2) polymorphic transformations of silicates, 3) the reactions of formation of simple substances and oxides. In studying the thermodynamics of reactions in the system CaO - SiO_2, the authors give a quantitative explanation by calculations of the primary formation of calcium orthosilicate, regardless of the compositon of the

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initial mixture (Fig. 1,a) [Note: both in the test and in Fig. 1 the accepted symbols are used, i. e., A-Al_2O_3, C-CaO, M-MgO, S-SiO_2, H-H_2O.] The calculations led to the following conclusions: 1) In synthesizing mullite from oxides at a ratio of A:S = 1:1 the primary product is mullite ($\Delta Z_{1,200^\circ K}$ = -66,810 cal/mole); 2) In the reactions of kaolinite transformation in heating, the calculations were made from metakaolin ($\Delta H_{298.16^\circ K}$ = -767,500 cal/mole; $\Delta Z_{298.16^\circ K}$ = - 719,410 cal/mole). Hereby it became apparent that within the entire temperature range the most probable result was mullite ($\Delta Z_{1,000^\circ K}$ = - 104,740 cal/mole and $\Delta Z_{1,600^\circ K}$ = - 96,240 cal/mole). 3) The possibility is proven of sillimanite and minerals of its group being transformed into mullite ($\Delta Z^{AS}_{1,800^\circ K}$ = -9,470 cal/mole), and when adding Al_2O_3 these reactions are even preferred ($\Delta Z^{AS}_{2,800^\circ K}$ = - 61,640 cal/mole). 4) Calculations were also made on the possible decomposition of metakaolin to oxides $AS_2 \rightarrow \gamma$ - A + $2S_{st}$ which revealed that metakaolin is several times less preferable ($\Delta Z_{1,200^\circ K}$ = - 34,220 cal/mole) than the reaction of sillimanite formation ($\Delta Z_{1,200^\circ K}$ = - 90,370 cal/mole), and even mullite ($\Delta Z_{1,200^\circ K}$ = - 103,260 cal/mole) from the same metakaolin. 5) Special interest was shown from the geochemical standpoint in the reaction of kyanite transforming to sillimanite. Calculations showed that this transformation is possible and at 1,800°K,

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ΔZ = - 2,410 cal/mole (ΔH = 3,000 cal/mole). The study of certain reactions in the BaO - SiO_2 system was later completed and made more accurate by data of new thermodynamic findings (Ref. 53, 54). The calculations made previously on the BaO - Al_2O_3 system were later more accurate (Ref. 29, 62). Of four possible reactions the most preferable were: in the temperature range from 298 to 700°K (when the reaction is actually not yet taking place), decomposition to carbonates ($\Delta Z_{600°K}$ = - 4,400 cal/mole); in the range of 700 to 1,200°K - reaction with the formation of MgO and $CaCO_3$ ($\Delta Z_{1,200°K}$ = - 31,310 cal/mole) and above 1,200°K, decomposition to oxides $\Delta Z_{1,400°K}$ = 49,500 cal/mole, which is in complete agreement with existing experimental findings (Ref. 64). The work of Tamman (Ref. 76) was the first attempt of applying thermodynamics to melted slag from the standpoint of their ionic structure. Based on static thermodynamics of real ionic solutions (Ref. 81) formulae were derived which enable one to compute the equilibrium content of slag in metal in a given composition of elements, such as sulfur, oxygen, manganese and phosphorus. The application of thermodynamics can be converted to numerical values for systems, where the state equation is given. For real systems, where the theory of state has not yet been derived (in this case

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the theory of solutions), great importance is attached to methods based on empirical data, namely, the "method of activity". The coefficients of activity of saturated solutions of dihydrate and semihydrate gypsum at 298°K are determined according to the formula:

$$-\lg \gamma_{\pm} = \frac{i_+ \cdot i_- \cdot A\sqrt{\mu}}{1_+ a_o B \sqrt{\mu}}$$

where i_+ and i_- are the ion charges; μ the ionic power of the solution; a_o the size of the ions; A and B are constants. The total thermal effect of the hardening process of the gypsum is thus equal to 2,860 + 1,750 = + 4,160 cal/mole, which corresponds well with experimental data on heat liberation in the hardening of gypsum (Ref. 65). For the thermodynamic analysis of the hydration reactions in the systems β- C_2S - H_2O; C_3S - H_2O; $Ca(OH)_2$ - SiO_2 - H_2O, an approximate method of calculation was used for the unknown standard heats of formation of the calcium hydrosilicates, according to the average values of the bond energies. In the system β- C_2S - H_2O the primary product, up to 65°C, is hillebrandite, and up to 160-170°C afwillite (Fig. 2). In the system C_3S - H_2O the primary product

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is hillebrandite (Fig. 3). In the system $Ca(OH)_2$ - SiO_2 - H_2O reactions for 7 compositions were investigated. For the composition C:S = 2:1 and more alkaline compositions 3:1, 4:1, etc., the primary product is hillebrandite. For compositions C:S = 3:2, 4:3 (and intermediary ones between these) the primary product is foshagite - $C_4S_3H_{1,5}$ - within the entire temperature range. For the composition 6:6 (1:1) the primary products are tobermorites, viz., tobermorite $C_5S_6H_{10,5}$ up to 60°C - 14Å, and up to 170°C - 11Å, tobermorite $C_5S_6H_{5,5}$. Over 170°C for this composition the most preferable is xonotlite - C_6S_6H. For the composition 5:6 the primary products and most preferable ones up to 320°C are the tobermorites at 60°C - 14Å and from 60°C to 320°C 11Å, and at higher temperatures xonotlite. For compositions of C:S = 2:3, 1:2 and more acidic ones (1:3, 1:4, 1:5, etc.), the primary products, within the entire range of temperatures, are gyrolites $C_2S_3H_{2,5}$ (Fig. 4). There are 4 graphs and 95 references: 58 Soviet, 32 English, 4 German, 1 French.

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Figure 1:

Graph of the dependence of - ΔZ on the composition at certain temperatures (^{o}K) in the systems: a - $CaO - SiO_2$ at T = 1,400(^{o}K); δ (b) - $CaO - Al_2O_3$ at T = 1,200 ^{o}K; β (v) - $MgO - SiO_2$ at T = 1,600^{o}K; ι (g) - $Al_2O_3 - SiO_2$ at T = 1,600 ^{o}K.

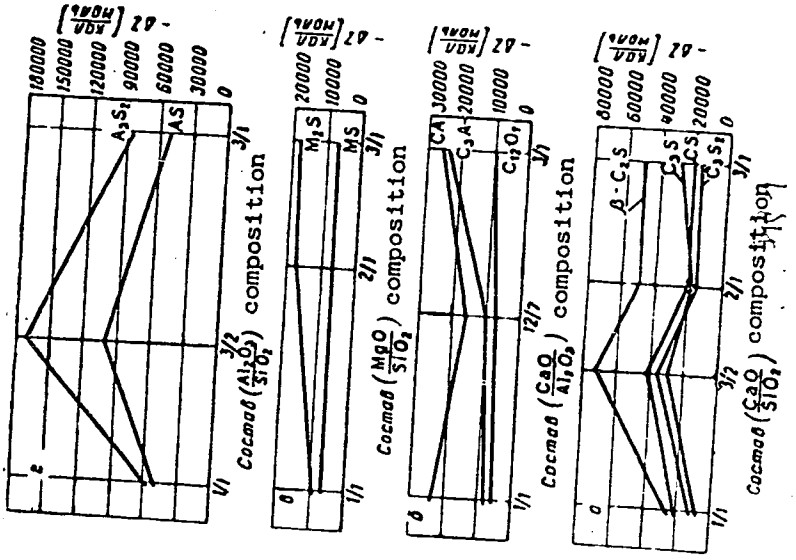

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Figure 2:

Graph of $\Delta Z = f(T)$ for the reaction in the system β= C_2S - H_2O, numbers of the reactions correspond to the formation:
1 - $C_2SH_{1,17}$; 2 - $C_3S_2H_3$; 3 - $C_4S_3H_{1,5}$; 4 - C_6S_6H; 5 - $C_5S_6H_3$; 6 - $C_5S_6H_5$; 7 - $C_5S_6H_{10,5}$; 8 - $C_2S_3H_{2,5}$; 9 - CS_2H_2.

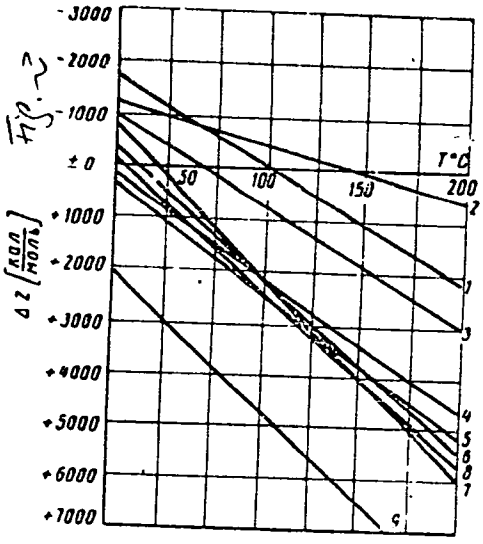

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Figure 3:

Graph of $\Delta Z = f(T)$ for reactions in the system $C_3S - H_2O$ (the reactions aremarked in the same way as in Fig. 2)

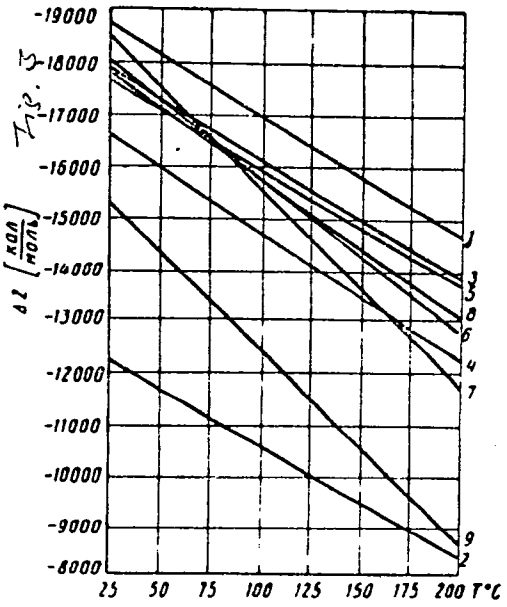

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Figure 4:

Graph of the dependence on the composition at 175°C for reactions in the system $Ca(OH)_2$ - SiO_2 - H_2O (the reactions are marked as in Fig. 2 and 3)

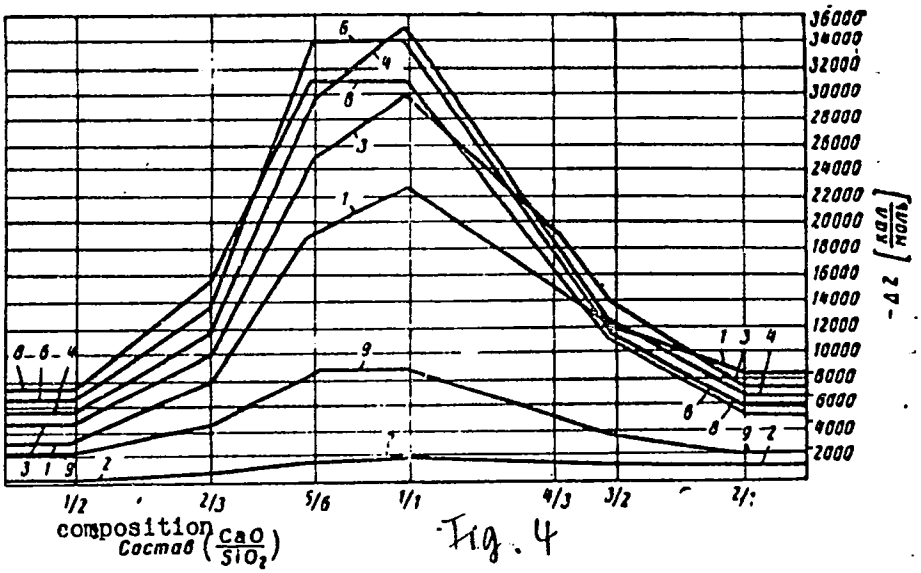

Fig. 4

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B015/B060

AUTHORS: Mchedlov-Petrosyan, O. P., Vorob'yev, Y. L.

TITLE: Prospects of Application of Some Natural Magnesium Hydrosilicates in Industry

PERIODICAL: Silikattechnik, 1960, No. 10, pp. 466-472

TEXT: The present article has been translated by Dr. G. Wagner, Berlin. The authors discuss the structure of serpentinite along with its binding properties and mention papers by Syromyatnikov, Medvedev (tests conducted at the asbestos-enriching plant of the Association "Soyuzasbest"), Oganesyan, Budnikov, and Bereshnoy (Ref. 6), Vernadskiy (Ref. 12), Roginskiy (Ref. 23), Belov (Refs. 39-41), Sobolev (Ref. 42), Zhuravlev (Ref. 47), Bernal, Rebinder, Ratinov, and others. Figs. 7 and 8 illustrate the authors' idea of a simplified scheme of the modifications undergone by serpentinite on heating. This scheme permits establishing the correlation among partial dehydration, presence of lattice distortions, and appearance of activity. The re-arrangement of the

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tetrahedra on the transition from antigorite to forsterite can take place in three ways, viz., by slight rotation around the symmetry axis of the antigorite tetrahedron; from two peak oxygen atoms and the central OH ion from a destroyed tetrahedron; by the displacement of base oxygen atoms from destroyed tetrahedra and transition of the OH ion to O at the vertex. The scheme offered here differs from those of other authors on related minerals by the presence of a stage of active state. The region of formation of this metastable transition state appears during the heating process prior to the complete disappearance of the antigorite crystal lattice and the formation of forsterite in the range of 600-700°C for serpentinite, and 700-750°C for precious serpentinite, or, in other words, on heating to the temperature of the maximum endothermal effect (Fig. 10, thermogram). Potentiometric investigations of the hydration process in serpentinite cement have shown that a pH drop may be observed in the period of active hydration (Table 1). In the back-hydration of the cement (dehydration of the intermediate) there occurs

under the action of OH ions a crystal-chemical dispersion of the cement granules of the medium in particles of colloidal size as well as a structure formation on their basis and a crystallizing intergrowth of resulting aggregates, in which connection a partial superficial dissolution of the binding agents, formation of oversaturated solutions, and crystallization are possible. The authors base on their study of the properties of serpentinite cement to conclude as follows: the energy of the crystal lattice of binding agents must be considerably larger than the energy of the crystal lattice of the corresponding hydrates. The excess free energy from mineral formations possessing binding agent properties is caused by the presence of lower or degenerate coordinations of active structure cations. The pH is of greatest importance in the development of binding agent properties. Hydrates must form stratified crystals. Next, the authors supply data regarding the properties and the technology of serpentinite cement. A characteristic of the latter is that the rock is ground before burning, so that insufficient or excess burning is avoided and great economy is achieved. Mention is made of building materials on the basis of serpentinites, such as concrete and

Prospects of Application of Some Natural Magnesium Hydrosilicates in Industry

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mortar, road surfaces and other coatings, construction units and ornamental objects. The use of serpentinites as raw materials for the chemical industry and the production of refractories is also discussed. Akunov, Bazhenov, and Sal'nikova, Geriyeva, Desov are mentioned in the text. There are 11 figures, 1 table, and 60 references: 42 Soviet.

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ZAVGORODNIY, N.S.; MCHEDLOV-PETROSYAN, O.P.; SIDOCHENKO, I.M.; STRELKOVA, I.S.

Termographic characteristics of marls from the Amvrosiyevka deposits.
TSement 26 no.4:8-10 Jl-Ag '60. (MIRA 13:11)
(Marl)

BELOV, N.V.; PRIKHOD'KO, N. Ye.; SIMONOV, V.I.; FLORINSKAYA, V.A.; MCHEDLOV-PETROSYAN, O.P.

Symposium on the study of silicates of monovalent and divalent cations. Zhur. prikl. khim. 33 no.11:2598-2600 N '60. (MIRA 14:4)

(Silicates--Congresses)

AUTHORS: Budnikov, P. P., Corresponding Member of the AS USSR and Mchedlov-Petrosyan, O. P.

TITLE: On the Thermodynamics of the Change of Kaolinite on Heating

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 2, pp. 349-350

TEXT: The authors report on the study of the thermodynamical changes of kaolinite on heating. Up to now they have been using the data for metakaolinite ($\Delta H_{298.16^\circ K}$ = —767 500 cal/mole, $\Delta Z_{298.16^\circ K}$ = -719 410 cal/mole) for calculating the transformation reactions of kaolinite. In this case, the formation of mullite is the most probable in the entire temperature range ($\Delta Z_{1000^\circ K}$ = -104 740 cal/mole, $\Delta Z_{1600^\circ K}$ = -92 240 cal/mole). When adding alumina the mullite formation from metakaolinite proceeds with a stronger change of free energy than without alumina addition ($\Delta Z_{1800^\circ K}$ = -203 020 cal/mole). In this case, mainly mullite ($\Delta Z^{A_3S_2}_{1800^\circ K}$ = -203 020

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cal/mole) is formed, whereas in the formation of sillimanite $\Delta Z^{AS}_{1800^\circ K}$ = -141 220 cal/mole). The authors follow another method of calculation. They proceed from kaolinite (Table 1) by using new data (Refs. 5-7). The thermal capacity of kaolinite was determined from oxides and water by the additive reaction (Ref. 8). On the basis of the data of Table 1 the authors studied the reactions (1) - (4). The calculation of these reactions gives the equations (1) - (4). Fig. 1 shows the results of these calculations. The results obtained by the authors thermodynamically explain for the first time the formation of metakaolinite at about 900°K (600°C). Metakaolinite is not formed at lower temperatures, even not after protracted heating. Since the straight lines for the reactions (2) and (4) (Fig. 1) lie close to each other the authors conclude that sillimanite and mullite may form with almost the same thermodynamical probability. Apparently, the formation of various compounds is determined by kinetic factors, especially by the degree of crystallization of the kaolinite used. The authors maintain that this opinion agrees with the most recent findings (Refs. 9, 10) concerning the change of kaolinite during heating and with their own observations (Ref. 1) as well as with

their interpretation of the first exothermic stage (Refs. 1,2). There are 1 figure, 1 table, and 10 references: 4 Soviet, 3 US, and 1 German.

SUBMITTED: May 17, 1960

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \rightarrow Al_2O_3 \cdot 2SiO_2 + 2H_2O \text{ пар; (vapor)} \quad (1)$$

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \rightarrow Al_2O_3 \cdot SiO_2 + SiO_2 + 2H_2O \text{ пар;} \quad (2)$$

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \rightarrow \alpha Al_2O_3 + 2SiO_2 + 2H_2O \text{ пар;} \quad (3)$$

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \rightarrow \frac{1}{3}(3Al_2O_3 \cdot 2SiO_2) + \frac{4}{3} SiO_2 + 2H_2O \text{ пар.} \quad (4)$$

$$\Delta Z = +80814 - 11{,}72T \cdot \ln T + 10{,}69 \cdot 10^{-3}T^2 - 2{,}27 \cdot 10^5 T^{-1} - 22{,}6T; \quad (1)$$

$$\Delta Z = -9605 - 10{,}33T \cdot \ln T + 7{,}99 \cdot 10^{-3}T^2 + 3{,}38 \cdot 10^5 T^{-1} - 26{,}02T; \quad (2)$$

$$\Delta Z = +35964 - 6{,}74T \cdot \ln T + 5{,}36 \cdot 10^{-3}T^2 + 2{,}92 \cdot 10^5 T^{-1} - 46{,}4T; \quad (3)$$

$$\Delta Z = -26712 + 0{,}09T \cdot \ln T + 6{,}3 \cdot 10^{-3}T^2 + 1{,}95 \cdot 10^5 T^{-1} - 93{,}85T. \quad (4)$$

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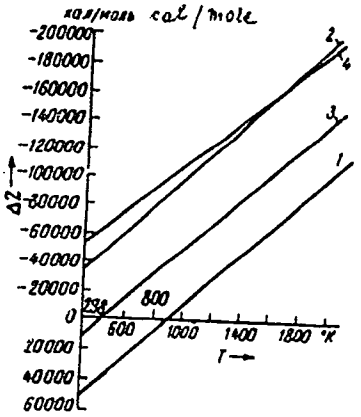

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MCHEDLOV-PETROSYAN, O.P.,prof., doktor tekhn. nauk, red.; DONSKOY, Ya.Ye., red.; LIMANOVA, M.I., tekhn. red.

[Large wall blocks and slabs made of local raw materials] Krupnye stenovye bloki i paneli na mestnom syr'e. Pod red. O.P.Mchedlova-Petrosiana. Khar'kov, Khar'kovskoe knizhnoe izd-vo, 1961. 233p. (MIRA 14:11)

1. Kharkov. Yuzhnyy nauchno-issledovatel'skiy institut promyshlennogo stroitel'stva. 2. Chlen-korrespondent Akademii stroitel'stva i arkhitektury USSR (for Mchedlov-Petrosyan).
(Walls) (Precast concrete construction)

MCHEDLOV-PETROSYAN, O.P.; BABUSHKIN, V.I., kand.tekhn.nauk

Thermochemistry and thermodynamics of unhydrated and hydrated cement minerals. Zhur. VKhO 6 no.6:677-680 '61. (MIRA 14:12)

1. Chlen-korrespondent Akademii stroitel'stva i arkhitektury (for Mchedlov-Petrosyan).
(Cement) (Hydration) (Thermochemistry)

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S/070/61/006/006/005/008
E132/E135

AUTHORS: Mchedlov-Petrosyan, O.P., and Babushkin, V.I.

TITLE: On the role of structural analogy and stoichiometry in the thermodynamic study of silicates

PERIODICAL: Kristallografiya, v 6, no.6, 1961, 933-936

TEXT: The authors have enunciated a principle which consists, in essence, of the assumption of the equivalence of the contributions to the energy by one or by several bonds, and also by separate structural groups (oxides, ions, saturated molecules, etc.) in compounds identical in structure and belonging to the same system. This principle enables one to overcome to some extent the shortage of thermochemical data on silicates. It has been tried out on calcium silicates and hydro-silicates, aluminates, etc. For hillebrandite and foshagite the method proved completely satisfactory and slightly less so for xonotlite. For these calculations the bond energies of Ca-O bonds derived from beta- wollastonite, Ca-OH from portlandite and Si-O from beta-quartz. A discussion is given of the possibilities of transitions from one material to another which

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On the role of structural analogy and...

requires consideration to be made of the crystal structures not only of the initial and end compounds but of the material in the intermediate state, to determine whether the reaction is realisable as well as whether it is energetically possible.
V.A. Nikolayev is mentioned in the article.
There are 7 tables and 12 references: 8 Soviet-bloc and 4 non-Soviet-bloc. The English language references read as follows:
Ref.1: F.D. Rossini. Selected Values of Chemical Thermodynamic Properties. Wash. 1952.
Ref.2: H.A. Berman, S.S. Newman. Paper of the Fourth Symp. on the Chemistry of Cement. Wash., 1960.
Ref.4: S.S. Todd. J. Amer. Chem. Soc., Vol.72, 4742-4743, 1950.
Ref.7: E.S. Newman. J. Res. Nat. Bur. Stand. Vol.57, 1, 1956.

ASSOCIATION: Khar'kovskiy institut inzhenerov zh.-d. transporta im. S.M. Kirova
(Khar'kov Institute of Railway Transport Engineers imeni S.M. Kirov)

SUBMITTED: June 16, 1961

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G/005/61/000/007/006/006
D029/D109

AUTHORS: Mechedlov-Petrosyan, O.P., and Bunakov, A.G. (Kharkov)

TITLE: Physical-Chemical bases of the production and after-treatment of concrete and concrete products

PERIODICAL: Silikat Technik, no. 7, 1961, 338-339

TEXT: The article is a continuation from Silikat Technik, no. 6, p 294. For the mathematical consideration of the heardening of concrete, it is practical to reduce the processes to a physical model. Such model must obviously be a medium statistic cell of a structure from which similarity relations to the hardened cement or concrete can be established. By applying mechanical stress before the end of the setting time, it is possible to increase the strength of the concrete by 10 - 15%. Concrete shows an analogous behavior under physical-chemical corrosion. The application of plastifying agents lengthens the setting time when this is desired. The same effect has cooling of the concrete during setting. An instantaneous freezing increases the final strength. A heating of the concrete shortens the setting time. There are 3 figures, and 11 references: 10 Soviet-bloc and 1 non-Soviet-bloc.

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MCHEDLOV-PETROSYAN, O.P.; BUNAKOV, A.G.; LATYSHEV, F.A.; CHESNOK-SMOTRICH, G.V.

Choosing automated manufacturing techniques for large structural articles. Stroi.mat. 7 no.8:16-18 Ag '61. (MIRA 14:8)
(Precast concrete)

BABUSHKIN, Vladimir Ivanovich; MCHEDLOV-PETROSYAN, Otar Petrovich; KOME DANT, K.P., red.; YEREMINA, I.A., tekhn. red.

[Silicate water-resistant elements]Silikatnye vodostoikie izdeliia. Kiev, Gosstroiizdat, USSR, 1962. 98 p. (MIRA 16:2)

(Sand--Lime products)

BABUSHKIN, Vladimir Ivanovich; MATVEYEV, German Mikhaylovich; MCHEDLOV-PETROSYAN, Otar Petrovich, doktor tekhn. nauk, prof.; RABINOVICH, I.A., red. izd-va; RODIONOVA, V.M., tekhn. red.

[Thermodynamics of silicates]Termodinamika silikatov. Pod obshchei red. O.P.Mchedlova-Petrosiana. Moskva, Gosstroiizdat, 1962. 265 p. (MIRA 16:3)

1. Chlen-korrespondent Akademii stroitel'stva i arkhitektury Ukr.SSR (for Mchedlov-Petrosyan).
(Silicates--Thermodynamic properties)

MCSEDLOV-PETROSZJAN, O.P. [Mchedlov-Petrosyan, O.P.]

Hypothesis on the theoretical basis of up-to-date concrete technology dealing with the formation of the structure of solidified cement. Epitoanyag 14 no.2:74-77 F '62.

ZAVGORODNIY, N.S.; MCHEDLOV-PETROSYAN, O.P.; SIDOCHENKO, I.M.; STRELKOVA, I.S.

Determination of slags and gypsum in cements by the thermographic method. TSement 28 no.2:13-15 Mr-Ap '62. (MIRA 15:8)
(Cement)

MCHEDLOV-PETROSYAN, O.P., doktor tekhn.nauk, prof.; FILATOV, L.G., inzh.

New expanding cement for hydraulic construction. Gidr. stroi. 32 no.5:30-32 My '62. (MIRA 15:5)

1. Chlen-korrespondent Akademii stroitel'stva i arkhitektury USSR (for Mchedlov-Petrosyan).
(Cements, Adhesive)

MCHEDLOV-PETROSYAN, O.P.; FILATOV, L.G.

Theoretical principles of the production of new expanding waterproof compositions based on portland cement. Dokl. AN SSSR 143 no.2:380-383 Mr '62. (MIRA 15:3)

1. Predstavleno akademikom P.A.Rebinderom.
(Binding materials)
(Portland cement)

MCHEDLOV-PETROSYAN, O. P., prof.

Physicochemical principles of the technology of concrete.
Zhur. VKHO 8 no.2:175-179 '63. (MIRA 16:4)

(Concrete)

BABUSHKIN, Vladimir Ivanovich; MCHEDLOV-PETROSYAN, Otar Petrovich; KOMENDANT, K.P., red.; YEREMINA, I.A., tekhn. red.

[Silicate water-resistant products] Silikatnye vodostoikie izdeliia. Kiev, Gosstroiizdat, USSR, 1962. 98 p. (MIRA 16:10)

(Silicates) (Building materials)

MCHEDLOV-PETROSYAN, O.P.

Present-day opinions on the cement hardening process.
Trudy IUzhgiprotsementa no.4:144-152 '63.
(MIRA 17:11)

MCHEDLOV-PETROSYAN, O.P.; [illegible]ATOV, L.G.

Principle of compensating expansion as the basis for the directional strengthening of cement stone. Zhur. prikl. khim. 37 no.9:1909-1915 S '64.

(MIRA 17:10)

BUDNIKOV, Petr Petrovich, akademik; OVCHARENKO, F.D., akademik, otv. red.; BEREZHNOY, A.S., red.; BUTT, Yu.M., prof., red.; MCHEDLOV-PETROSYAN, O.P., red.; AVGUSTINIK, A.I., prof.; BARZAKOVSKIY, V.P., doktor khim. nauk, red.; KUKOLEV, G.V., prof., red.; MATVEYEV, M.A., prof., red.; MCHEDLOV-PETROSYAN, O.P., prof., red.; ROYAK, S.M., prof., red.; POKROVSKAYA, Z.S., red.

[Chemistry and technology of silicates] Khimiia i tekhnologiia silikatov. Kiev, Naukova dumka, 1964. 608 p. (MIRA 17:12)

1. Akademiya nauk Ukr.SSR (for Ovcharenko). 2. Chlen-korrespondent Ukr.SSR (for Berezhnoy). 3. Chlen-korrespondent AN SSSR i deystvitel'nyy chlen Pol'skoy Akademii nauk , AN Ukr.SSR (for Budnikov).

MCHEDLOV-PETROSYAN, O. P.; MATVEYEV, G. M.; SAFONOV, V. S.

"Investigation of energetics of devitrification processes as a method for studying glass structure."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad, 16-21 Mar 64.

OL'KHOVOY, L.G.; SHEVCHENKO, L.P.; BABUSHKIN, V.I.; BYNAKOV, A.G.; MCHEDLOV-PETROSYAN, O.P.

Water resistant non-autoclaved materials of hydraulic lime and silica. Stroi.mat. 10 no.8:16-18 Ag '64. (MIRA 17:12)

PAPKOVA, L.P.; GEVORKYAN, Kh. A., MARDIROSOV-PETROSYAN, G. A.

Binding materials of some ancient Armenian structures. Izv. AN Arm. SSR. Ser. tekh. nauk 17 no.6:61-66 '64 (MIRA 18:7)

MCHEDLISHVILI-PETROSYAN, O.P.; PAPKOVA, L.P.

Building materials of some ancient constructions in Sukhum. Soob. AN Gruz. SSR 34 no.3:745-752 De '64 (MIRA 18:1)

1. Institut stroitel'noy mekhaniki i seysmostoykosti AN Gruzinskoy SSR. Submitted July 10, 1963.

BABUSHKIN, Vladimir Ivanovich; MATVEYEV, German Mikhaylovich; MCHEDLOV-PETROSYAN, O.P., doktor tekhn. nauk, prof., red.

[Thermodynamics of silicates] Termodinamika silikatov. Moskva, Stroiizdat, 1965. 351 p. (MIRA 18:12)